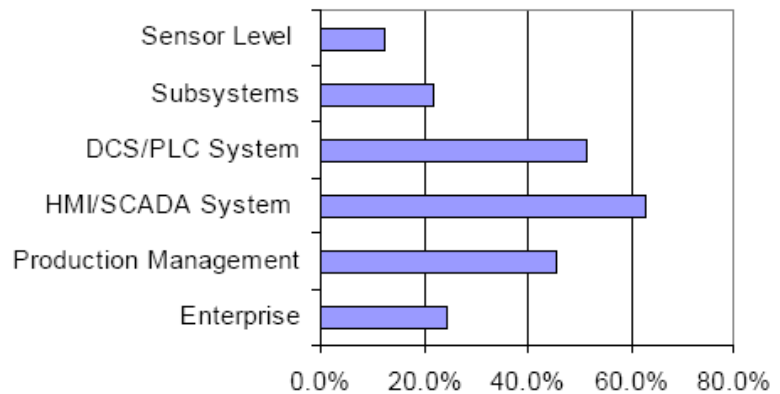


Demystifying OPC

OPC (“Object Linking and Embedding for Process Control”) is a series of standards specification. The first standard (originally called the OPC Specification and now called the **Data Access Specification**) resulted from the collaboration of a number of leading worldwide automation suppliers working in cooperation with Microsoft. Originally based on Microsoft’s OLE COM (component object model) and DCOM (distributed component object model) technologies, the specification defined a standard set of objects, and interfaces and methods to allow process control and manufacturing automation applications to facilitate interoperability. The COM/DCOM technologies provided the framework for software products to be developed. There are now hundreds of OPC Data Access servers and clients available.

ARC Advisory Group (a Boston based research firm) suggests that OPC has greater than 60% adoption for HMI/SCADA systems of which application would be for PLC communications.

“Using OPC provides a standard interface between the PLC and HMI/SCADA and allows customers to choose best-of-breed products.”



This interoperability allows multiple OPC clients or applications to connect to single OPC Server to access PLC (or any field device) data simultaneously. An example of this may be an alarm package, a downtime analysis application, or two different HMI/SCADA hosts maintaining communication during change-over.

OPC technology is based on a publisher-subscriber model. In this architecture, an OPC server “publishes” data to an OPC client which “subscribes” to the data points it is interested in. When the publisher knows that the points have changed value, it will advise the OPC client or subscriber of those changes. This is very efficient on network bandwidth and doesn’t burden the OPC client or SCADA server with continuously polling for updates.

ClearSCADA uses this technology for its ViewX client-to-server communications. But instead of using native COM/DCOM, which can be difficult to setup, wraps the messages inside TCP/IP data packets; effectively ‘tunneling’ the communications.

So, is OPC applicable for RTU or WAN communications? Not as the native protocol to the RTU over the radio or WAN link because OPC is based on COM/DCOM and it expects a network that is highly reliable and has high bandwidth. Future versions of OPC, namely OPC-UA (“Universal Access”) may be able to be

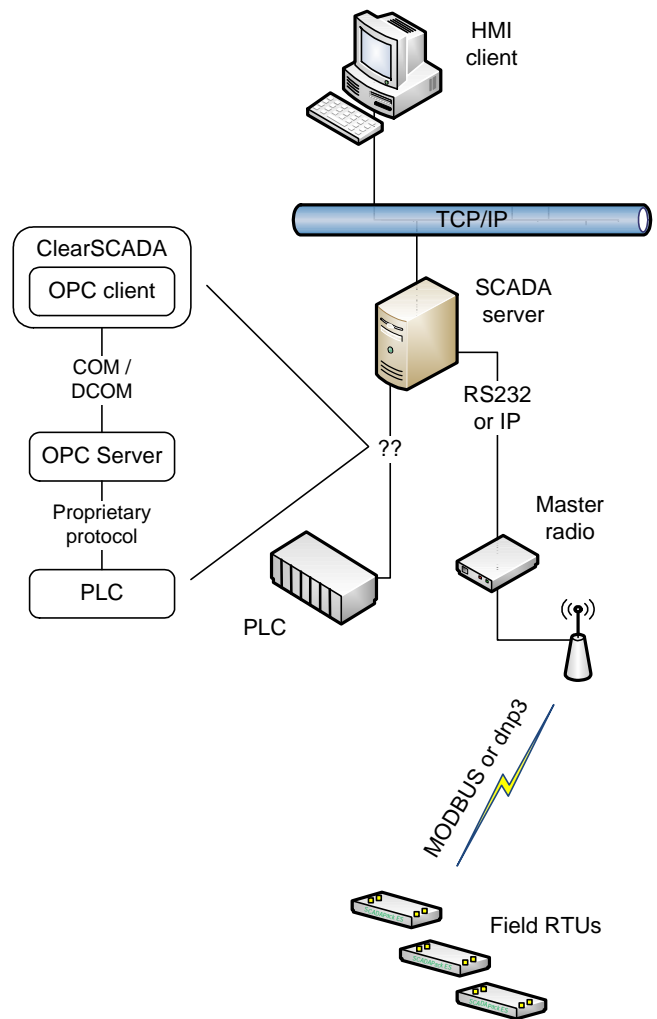
used in WAN situations because it is based on XML and Web Services. However, OPC-UA is not yet commercially available.

Let's have a look at the end-to-end stack for getting data from a PLC and RTU all the way through to the SCADA server and HMI screen. Starting with the remote RTUs, which are generally connected via low-bandwidth links (e.g., radio, dial-up, satellite, cellular), you will find the most common protocol is MODBUS and the rapidly emerging DNP3 standard. Both of these protocols are tolerant to intermittent communications, have efficient data transfer, and have varying degrees of diagnostics. Please note that some SCADA vendors require the use of a "Master RTU" to act as the polling engine – this is not required in ClearSCADA.

For the connection to the PLC, it doesn't matter what brand of PLC we are talking to; there are many choices of OPC servers that can be used. Some PLC vendors have their own OPC Server such as Rockwell with their RSLinx product. But there are 3rd party vendors, such as Kepware, which support all major brands.

The diagram expands the view on how the PLC to SCADA server is connected. The OPC server is in the middle with one "side" connecting to the PLC using the PLC's native protocol (usually proprietary in nature). Using Rockwell as an example, the OPC server would support DF1, DH, DH+, Ethernet and ControlLogix Ethernet. The other "side" of the OPC server allows connection to any OPC client and, in the case of ClearSCADA, this would be the OPC client driver.

I hope this has helped in understanding OPC technology and provided guidance on its application within SCADA.



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